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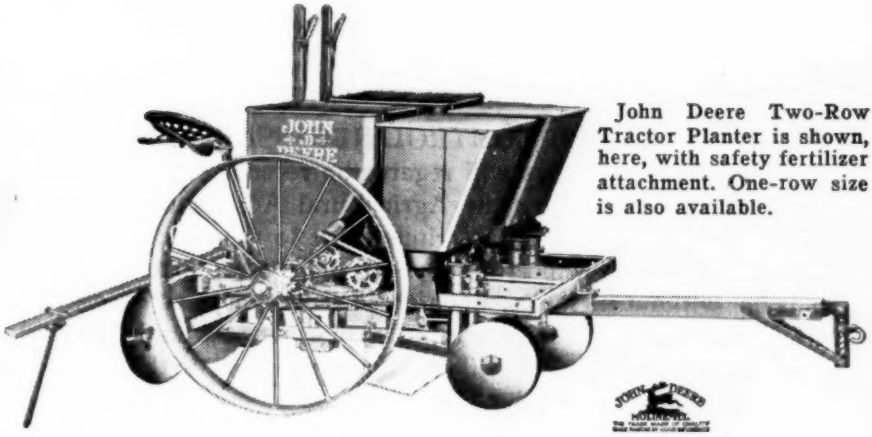

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American Potato Journal

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SOMERVILLE, N. J. NEW BRUNSWICK, N. J.

CREDIT CONTROL NECESSARY

Some potato growers will regard the recent action of the Supreme Court in declaring the Agricultural Adjustment Administration unconstitutional as a serious blow to the industry. They are convinced that, while the proposed plan to regulate the industry is not without its faults, an enforced reduction in acreage would be followed by increased returns. Other growers who do not welcome government control will acclaim the action of the Supreme Court since they believe that the present situation in the potato industry will finally adjust itself. It is their belief that the inefficient or unfortunate grower will be forced to discontinue operations as the result of failure to secure sufficient funds to finance the planting of the crop. This method of controlling production has not been successful in the past and it is doubtful if it will prove to be so in the future.

Production control should begin at home. Each potato growing section should emphasize the need of curtailed production. The various credit agencies, in particular, should give this matter serious consideration. It is not sound to advance excessive credit in the form of seed potatoes, fertilizer or money when this is certain to result in over-planting and low prices. The present condition in the industry is in no small measure due to the efforts of certain agencies to increase their volume of business. Within certain limits this is desirable but these agencies must appreciate that their contribution toward increased plantings render their chances of collection, and the growers chance of making a living, rather remote.

Concerted action on the part of credit agencies and the growers will be followed by a reduction in planting. We have looked to Washington to adjust our difficulties when the logical procedure is to start at home. We know approximately how many acres we can plant and expect to make fair returns. Must we be forced to reduce the acreage to this level or are we willing to do it voluntarily? The latter method would mean more to the industry since it would largely eliminate consumer reaction.

American Potato Journal

Volume XIII January, 1936 Number 1

THE POTATO ASSOCIATION OF AMERICA AND THE POTATO INDUSTRY

JOHN TUCKER

Central Experimental Farms, Ottawa, Canada

The year now past has been a momentous one for the potato industry. The 1934 bumper late crop of high quality potatoes did not bring to the producers and affiliated interests, the prosperity that it should have and the year started with glutted markets and abnormally low prices in evidence everywhere, a condition which continued for the rest of that crop year. The situation brought to a climax the discontent which has been brewing for some years and, as a result, definite plans have now been made to attempt to balance production with normal demand and to improve the marketing and distribution of future crops. How successful the project will be remains to be seen; it has definite possibilities and a somewhat similar plan has been in successful operation in Great Britain for the past two years. The plan represents much careful thought and preparation on the part of the leaders of the industry and an earnest effort on the part of government officials concerned to place the industry on a sound basis; it, therefore, deserves a fair trial.

The 1935 crop is not so large as the 1934 crop, but prices showed little improvement until after the extent of the frost damage at harvest time became known. However, they appear to be improving now. In Canada there is a definite improvement in all except the Prairie Provinces. The smallest acreage in approximately 20 years, and lower than average yields has improved the price situation to so great an extent that the Eastern Canada Potato Marketing Board has found it unnecessary to function this year. In general, it seems reasonable to assume that with the wide-spread interest that is now being taken

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Presidential Address delivered at the 22d annual meeting of the Potato Association of America, in session at the Municipal Auditorium, St. Louis, Missouri, Dec. 31, 1935 to Jan. 2, 1936.

in the industry, the potato outlook on the North American Continent is brighter now than it has been for many years.

The potato crop of this Continent, averaging well over four hundred million bushels per annum, a perishable crop grown in a wide range of soils and under widely varying environmental conditions, subject to more diseases and insect pests than possibly any other crop; offers a never ending challenge to the Horticulturist, Plant Pathologist and Economist, as well as to the grower, distributor, and all manufacturing interests connected with the industry. Our Association is unique in that it is composed of men prominent in the sciences referred to and all branches of the industry throughout the country and some in foreign lands, held together with a genuine desire to co-operate with one another for the ultimate improvement of the crop, and to encourage and prompt legislation in support of, and for the benefit of the industry at large.

In operation for more than 20 years, the Association has a clear understanding of the status of the industry and the nature of its problems and is, therefore, in a position to tender guidance and foster the industry as a national enterprise, by encouraging investigations of specific and worthwhile problems. In this broad field there are diverse problems for the Association to deal with and to those members who feel that certain popular subjects may be receiving undue prominence at this time, may I point out that a study of our past records will show that each important subject has received prominence at some time in the past and will undoubtedly come to the fore again at some future date. The following short list of some of the subjects which have had prominence in the past, will serve to illustrate this point. Variety testing, rates of planting tests, types of seed piece tests, investigations of problems fundamental to seed vitality, seed certification, storage and rest period phenomena, spraying and dusting, group classification and description of varieties, regional adaptation and disease resistance of potato types, fertilizers, seed and soil treatments, marketing problems, etc. We have a very interesting and instructive program this year, and it is evident that many important problems have received adequate attention during the past year. All the papers presented here will be published in the American Potato Journal and thus made available to all our members.

Referring to our Journal, there has been an encouraging increase in the number of contributors, particularly to the sectional notes. This is a healthy sign for it means that more are becoming

interested and this should lead to an increase in the membership and more funds for our printing appropriation. If the quantity of correspondence received this year in connection with the journal can be taken as a guide, we may expect some real interest to be shown when this subject comes up for discussion.

There appears to be a very definite downward trend in the consumption of potatoes on this Continent, and this subject should receive some serious consideration. People are not consuming the quantity of potatoes that they formerly did. Can the amount consumed not be increased by improving the flavor, quality, vitamin content, or is the value of potatoes as a health foodstuff not receiving the attention it should. Excellent progress has been made toward increasing yields; it would apparently help the industry more at this time if consumption could be materially increased.

MAGNESIA AND LIME FOR POTATOES IN CONNECTICUT

B. A. Brown

Agricultural Experiment Station, Storrs, Conn.

During the past ten years, this Journal has printed at least twelve papers pertaining to one or more phases of the problem of magnesia and lime for potatoes. Seven of the papers appeared in 1933 and 1934. The relatively large number in those years was apparently the result of investigations stimulated by the findings in Maine in 1930 that some potato fields were suffering severely from insufficient magnesia. To a large extent growers and investigators of the potato have become magnesia and lime "conscious" since 1930. In Connecticut, many commercial growers are adding a carrier of soluble magnesia to their regular fertilizers as insurance against a possible deficiency. Also, many fertilizer companies are using dolomitic lime or a carrier of soluble magnesia in their mixtures.

As several other contributors to this Journal have reviewed or cited the literature, it will not be repeated here. In general, it may be stated that most of the Atlantic Seaboard States have reported tests or experiments where definite and direct benefits to the potato have resulted from adding magnesia, lime, or both, to the normal fertilizer. As the potato is liberally fertilized with N, P . . . and K in this region and as it is largely tolerant to acidity per se, one might expect that the soils in many fields in the eastern United States would supply insufficient soluble magnesia and lime for the optimum nutrition of the crop.

In Connecticut, experiments were initiated in 1932 to learn if the potato crop would be improved by either magnesia or lime. In order to obtain varied soil conditions, most of the tests were located on commercial potato farms. During the four years, 1932 to 1935, seventeen experiments were conducted on seven farms and five different soil series. Also, in 1935, three growers reported to the writer the results of their own tests.

Methods

In most cases the test plots were one hundred feet in length, four to six rows of potatoes wide, and triplicated or quadruplicated on each field. The ordinary fertilizer, containing no magnesia or lime, was applied with the farmer's planter with no seed in the hopper and the rear covering disks removed. Then the carrier of magnesia or lime for each one hundred feet of row was weighed separately and carefully applied by hand in the furrow made by the planter. When this was finished, the potatoes were dropped and covered with the planter, this time with no fertilizer in the hopper.

During the season, the growers cultivated and sprayed the experimental areas the same as their other potatoes. At digging time, the yields were determined by weighing the tubers from the center rows of each plot.

Results

The soil characteristics and the yields of potatoes for each farm in 1932 and 1933 are given in tables 1 and 2. Numbers 1, 2, and 3 are commercial potato farms and potatoes had been grown many times on the experimental areas, but, as far as could be learned, without magnesia or lime. The test soil on farm number 4 was badly run out, having been mowed and pastured for a long period without any fertilization. Numbers 5 and 6 are Experiment Station property. The former received limestone, containing 4 per cent magnesia, at one ton per acre in 1926, while the latter had not been treated with magnesia or lime during its experimental history.

By referring to the tables, it may be seen that the soils on all farms were low in soluble magnesia and very low in soluble lime. On three fields in each year, the soils were very strongly acid, being well below pH 5. All fields were inspected about July 1, but in no case had the magnesia or lime made appreciable improvements in the appearance of

Table 1—Magnesia and Lime for Potatoes 1932

Farm No.	pH	Soil Characteristics Pounds per Acre[1] Magnesia	Lime	Organic Matter (%)	Total Bushels per Acre Magnesium Sulfate[2] 100 Pounds	200 Pounds	Dolomitic Limestone[3] 200 Pounds	400 Pounds	No Magnesia or Lime
1	5.18	40	400	9.20	292	277	293	295	295
2	4.88	45	400	7.85	261	260	241	271	229
3	4.71	25	400	5.48	434	447	414	447	425
4	5.25	45	450	7.14	223	203	257	244	219
5	5.40	40	400	High	261	265	288	262	279
6	4.84	40	400	7.12	200	209	207	202	232

[1]By Morgan's microchemical methods. See Bulletin 372 of the Connecticut Agricultural Experiment Station. In these tests, 20 pounds of magnesia are low and 400 pounds of lime are very low.

[2]The magnesium sulfate contained 16% magnesia (MgO).

[3]The dolomitic limestone analyzed 30 per cent lime (CaO) and 20 per cent magnesia (MgO).

the vines. The average yields on the magnesia and lime plots were somewhat greater on farms 2 and 4 both in 1932 and 1933, but the differences were not statistically significant. In several cases, the 200 pound applications of magnesium sulfate produced smaller crops than 100 pounds. As the salt was applied in the furrow by hand and subsequently mixed with the soil around the seed piece by the opener of a planter, it is probable that some "burning" occurred. On farm 2 in 1933, apparently the hydrated lime counteracted the toxicity, antagonism of ions, of the magnesium sulfate.

Table 2—Magnesia and Lime for Potatoes, 1933

Farm No.	pH	Soil Characteristics Pounds per Acre Magnesia	Lime	Total Bushels per Acre Magnesium Sulfate 100 Pounds (1)	200 Pounds (2)	Calcic Hydrated Lime 150 Pounds (3)	Treatment 2 plus Treatment 3 (4)	No Magnesia or Lime (5)
1	4.82	40	400	340	369	342	353	350
2	4.75	45	400	238	223	234	256	211
3	4.70	25	400	318	311	322	330	324
4	5.25	45	450	213	168	203[1]	210[2]	182
5	....[4]	..	...	242[3]	...	...	...	[3]237

[1]Dolomitic limestone at 200 pounds per acre.

[2]Dolomitic limestone at 400 pounds per acre.

[3]Average of 40 plots with 10 different fertilizer treatments.

[4]Plots varied, depending on previous treatments. The most acid plot had a pH of 4.96, the least acid 5.72.

In 1934 and 1935, the tests were repeated on another section of the same field on farm number 4. The soil characteristics were the same as given for that farm in table 1. The average yields follow:

	Total Bushels per Acre				
	Magnesium Sulfate		Dolomitic Limestone		No Lime or
Year	100 Pounds	200 Pounds	200 Pounds	400 Pounds	Magnesia
1934	277	241	282	275	257
1935	250	239	229	248	226

Again, the data indicate some beneficial effects of the magnesium sulfate at 100 pounds of the dolomitic limestone, and also some injury from magnesium sulfate at 200 pounds. In most respects, the 1934 and 1935 results on this farm are in harmony with those of the two previous years.

A simplified test was run on farm number 2 in 1934. Two five-row plots, 600 feet long, were treated, one with magnesium sulfate at 100 pounds, and the other with dolomitic limestone at 200 pounds. The total yields were:

Magnesium sulfate —284 bushels
Dolomitic limestone—295 "
No magnesia or lime—281 "

Thus, for the third successive year the plots with magnesia or lime yielded slightly more than those receiving the regular fertilizer only.

In 1934 on the Station farm (same conditions as number 5 in table 2), magnesium sulfate at 120 pounds was again applied to half the rows in twenty fertility plots in their sixth year of continuous potatoes. The average yields with and without magnesia were practically the same. In another test on the same field, dolomitic limestone failed to affect the vine growth or the production of tubers.

In 1935, quadruplicated plots for fifteen fertilizer treatments were laid out in a runout hay field on Merrimac sandy loam soil with an average pH of 5.1 and a low supply of soluble magnesia. Because of the dry weather throughout much of the growing season, the yields were very low. The data pertinent to the subject are given below.

Magnesia or Lime Treatment	Bushels per Acre
Calcic limestone 300 pounds	119
Dolomitic limestone, 300 pounds.....	119
Magnesium sulfate, 100 pounds.....	125
Magnesium sulfate, 200 pounds.....	99
No magnesia or lime.....	99

The differences between these average yields, although not statistically significant, indicate appreciable responses to both magnesia and

lime. Again, the larger application of magnesium sulfate gave poorer results than the smaller.

There were appreciable differences in the original reactions of the plots in this experiment. Therefore, the data for the four replicates of each of the five treatments containing no lime or other basic material were studied carefully to see if a correlation existed between soil reaction and yield. Within the existing range of reactions, pH 4.8 to 5.5, yields were not affected by acidity.

Tests on a farmer's field with a soil very low in soluble magnesia and lime and with a pH of 4.5, gave the following results the past season (1935).

1.	Magnesium sulfate, 200 pounds	130 bushels
2.	Emjeo, 100 pounds (32% magnesia)	150 "
3.	Calcic limestone, 200 pounds	158 "
4.	Dolomitic limestone, 200 pounds	160 "
5.	Treatment 2 plus treatment 3	148 "
6.	No lime or magnesia	165 "

Evidently no benefit resulted from the applications of magnesia and lime and where the soluble magnesium salts were added, the yields were reduced, probably because of burning.

Three farmers who conducted their own tests in 1935 reported their results. The soils on all farms were very acid, and so low in soluble magnesia that the owners were advised to use a carrier of that nutrient in their fertilizers. Briefly, their results were:

Number 1—Thirty pounds of magnesia from Kieserite increased the yield 19 per cent in one field and 5 per cent in another.

Number 2—Marked increase from hydrated (dolomitic) lime in one case. No difference in the second.

Number 3—Slightly better production from fertilizers containing magnesia.

General Discussion

On three of the five farms upon which tests were conducted in two or more years, it is clearly evident that neither magnesia nor lime improved the potatoes. On the other hand, the data from the other two farms suggest rather strongly that the magnesium sulfate and dolomitic limestone had increased the yields slightly. Of the two additional farms where tests were conducted in 1935, potatoes showed some response to both magnesia and lime on one, but to neither on the other.

The reactions of the different soils have varied from pH 4.5 to 5.4. Of the three soils showing some benefit from magnesia and lime,

two had reactions above pH 5, while of the four soils where potatoes were *not* improved by those nutrients, three had reactions considerably below pH 5. According to Morgan's microchemical methods, all soils showed very low amounts of soluble magnesia and lime. These facts emphasize the danger of making too specific recommendations on the bases of laboratory soil tests.

From the results of the seventeen experiments during four years and on most of our important soil series, it seems safe to conclude that the potato crop in Connecticut is not being reduced appreciably by a lack of magnesia or lime. However, most of our soils show reactions in the danger zone and as it is quite probable that many fertilizers will continue to carry large amounts of acid forming materials, the need for lime and magnesia may be expected to be greater in the future than is indicated now by the available evidence.

The experiments discussed in this paper were confined to measuring any *direct* responses of potatoes to magnesia and lime. The *indirect* effects of those materials, especially lime, may be far more important. There are many data showing that a considerable amount of organic matter in the soil is conducive to large yields of potatoes. Most of our best green manure crops are not so tolerant to acidity as potatoes. Moreover, the soluble phosphates in fertilizers are likely to decrease in effectiveness as acidity increases. Scab is usually not a serious problem in soils with reactions below pH 5.5. Therefore it appears to be a good policy to give a potato soil testing below pH 5.2 a light application (400 to 1000 pounds per acre depending on reaction and texture of the soil) of dolomitic limestone. Calcic limes may repress the solubility of the native soil magnesia enough to cause a shortage of that nutrient.[1, 2] Limestone rather than hydrated lime is suggested because of its more even effect on the reactions of the soil. Hydrated lime reacts with the soil colloids soon after application and may raise the pH for a short time to a point where scab might become a serious factor. Of course, hydrated lime might be the better in cases where liming immediately precedes a season devoted to green manure crops.

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[1]Chucka, Joseph A. 1934. Magnesium Deficiency in Aroostook Potato Soils. Amer. Pot. Jour. 11:29-35.

[2]MacIntire, W. H., Ellett, W. B., Shaw, W. M., and Hall, H. H. 1934. The Conservation of Burnt Lime, Limestone, Dolomite and Calcium Silicate in Soil as Influenced by Methods of Incorporation. Va. Agr. Exp. Sta. Tech. Bul. 54. (Also presented as Tenn. Agr. Exp. Sta. Bul. 152).

THE DEVELOPING AND GROWING OF CERTIFIED SEED POTATOES FOR SUBTROPICAL AND TROPICAL COUNTRIES

JULIAN C. MILLER*

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In studying potato production and seed requirements of southern countries, especially Cuba, it seemed that the Louisiana-grown seed potatoes, particularly U. S. No. 1 Small, size 1½ to 1⅞ inches, should prove satisfactory for fall and early winter planting; because Louisiana potatoes are harvested in May and could be held in cold storage until planting time. At this time the full rest period will be completed and the seed should germinate more readily than freshly harvested stock from the north. Then, too, for early planting, the small whole potato is desirable since the chances of the entrance of decaying organisms would be lessened.

Working upon the above assumption, preliminary experiments and commercial tests were started in 1932, when 100 sacks of a hundred pounds each of the Triumph variety were donated by Louisiana growers. These potatoes were shipped to the Cuban Department of Agriculture: 20 bags were sent to the Cuban Agricultural Experiment Station at Santiago de las Vegas and the remaining bags were distributed to leading growers throughout the Island. Shipments for experimental tests were also made to the following places: Florida, Texas, Porto Rico, Hawaii, Bermuda, Jamaica, Panama, Ecuador, and Argentine.

The results obtained in Cuba and elsewhere were very gratifying, demonstrating the advantage of the kind of seed that Louisiana could supply. In order to furnish seed of high quality and of known merit, it was necessary for the Louisiana potato growers to organize a Certified Seed Potato Growers' Association. This group selected the Agricultural Cooperatives of the Louisiana Farm Bureau, Baton Rouge, as their sales agent. In 1933, 8183 sacks of 100 pounds each were sold as compared with 10,934 in 1934 and 11,368 in 1935.

Because of the fact that the Louisiana seed has its full rest period, it can be planted immediately when offered for sale in September and October. The growers, in Cuba for example, can harvest potatoes from one month to six weeks earlier than they have in the past, in this way extending the period of time that they can produce their own potatoes.

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*The author wishes to extend his gratitude to all individuals and organizations cooperating so generously in the development of this project.

When northern- and Louisiana-grown seed have been available for planting at the same time, the Louisiana seed germinated from 10 to 14 days earlier, matured more quickly, and required only five irrigations and five sprayings. These operations are usually seven in number.

A satisfactory yield of potatoes in Cuba is seven pounds for one pound of seed planted. For the past three years, where the plantings have been made early, the Louisiana seed has averaged 12 to 1 and the highest yield in Cuba reported so far has been 21.5 to 1. The highest yield reported from any Experiment Station is that from Ecuador, where a yield of 60 to 1 was realized. It was also stated that this was one of the highest yields ever reported from that area.

While this industry has made satisfactory progress, there still remains a number of important problems to be solved before it can reach its maximum volume. The problems of storing and of handling the seed to and from storage have not been completely solved. The next problem and probably the most important is that of proper transportation and transportation facilities. There are many places, such as Bermuda and Hawaii, where the Louisiana-grown seed in experimental tests has done exceptionally well, but due to the fact that there are no direct boats from New Orleans to these points, or no cold storage facilities on boats connecting with ships calling at such ports, it is risky as well as expensive to deliver seed to these places.

THE GROWING OF CERTIFIED SEED IN LOUISIANA

The grower who wishes to raise potatoes for certified seed must first buy certified seed from one of the northern states, the foundation stock of which has been previously tested in Louisiana and found to be satisfactory. Before planting, the potatoes must be treated for such surface diseases as scab. During the growing season, an inspection of the field is made by the State Certified Seed Inspector when the plants are from 4 to 6 weeks old. At this time they are at the optimum stage for reading most of the virus diseases. Mild and rugose mosaics constitute most of the diseases found in seed potato fields in Louisiana. If the field passes inspection, the grower at harvest time grades his potatoes and the U. S. No. 1 Small, of the size 1½ to 1⅞ inches in diameter, are conditioned to meet Federal shipping point inspection. These potatoes are then shipped in 100-pound sacks to cold storage where they are kept at a temperature of 38° to 40° F. They remain in storage until ready for shipment, when they are removed and reconditioned and placed in new 100-pound sacks or crates, to which a certification tag is attached. For distant shipment, the crate is best. A final inspection is made by a Federal inspector before the shipment is made.

RESTRICTION OF THE NUMBER OF POTATO VARIETIES IN GERMANY

KARL SNELL

Chief of the Botanical Section of State Biological Institute for Agriculture and Forestry; Berlin-Dahlem, Germany

After 1870 a number of English and American potato varieties was introduced into Germany. Only a few of these remain to the present day. It may be of interest to mention them here very briefly.

In Europe, as a whole, the *Early Rose,* in German known as Frühe Rose, bred by Albert Bresee of Hubbardton, Vermont, from the variety Garnet Chili, is probably the best known of the American varieties. Unfortunately, this early-ripening variety with red tubers is not resistant to wart-disease and will be eliminated.

Another variety commonly known as Kaiserkrone is not immune Krebsfeste Kaiserkrone. This variety produced in Charlotte, Vermont, by O. H. Alexander, the breeder of Green Mountain, is still cultivated extensively in Germany. As it is early-ripening and also immune to wart-disease, it will, without doubt, continue to be grown.

Another variety commonly known as Kaiserkrone is not immune to wart-disease. This was found to be a synonym of the American variety *Early Puritan,* and was first introduced into England, and from there into Germany more than fifty years ago. This variety, however, is very seldom cultivated.

One of the earliest American varieties introduced is now known as the *"Daber,"*—the original name being unknown. It is immune to wart-disease, has reddish-colored tubers and is a late-maturing variety. As its cropping capacity is rather low, farmers do not like to cultivate it. There are some other varieties such as Peerless and Snow flake, cultivated in small quantities in Germany, but these are of no importance.

Other American and English varieties have been used for breeding purposes. During the last fifty years, German breeders produced a large number of new potato varieties. In 1925 a Synonym Committee was delegated to free the market from synonym potato varieties. As a result of the work of this committee the number of potato varieties was reduced to approximately two hundred and fifty. Last year this number was reduced still more by law. The Reichsnährstand eliminated all varieties of little importance and an official list of German varieties was published. At the present time, only sixty-six varieties are certified. By a second order of the Reichsnährstand, certified po-

tatoes only are allowed to be sold for seed. In Germany every farmer is allowed to cultivate what he likes, but if he wishes to buy new seed potatoes he has no possibility of purchasing varieties that are not on the official list. As a consequence the best varieties will be cultivated and only the best quality of seed will be used for planting. By these means we hope to produce the same quantity of potatoes on a smaller area and to have more land free for cultivation of other plants of which we have need.

The number of varieties on the approved list may appear to be rather large but this is necessary in order to satisfy the requirements of color, time of maturity, starch content, cooking quality and resistance to wart and other diseases. It is not intended, however, that the list of sixty-six varieties will be increased in the future. If a new and better variety is developed, it will be included on the list, but at the same time one of the old varieties will be removed.

POWDERY SCAB IN AUSTRALIA

A. Clem Foster

Potato Marketing Board of Tasmania, Sydney, N. S. Wales

The history of powdery scab is a record of alarums and excursions in Australia, no less than in the U. S. A. In February, 1915 the disease was discovered to have found its way to Canada and very soon afterwards to Maine and New York. Potato interests became alarmed and Domestic and Foreign Quarantines were imposed immediately.

During the year 1915 efforts were made to obtain all possible information on the life history and habits of the fungus. It then began to be clear that the fungus was naturally confined to the cool, moist northern states bordering Canada, and that even when diseased tubers were taken from that area and planted farther south the disease did not develop in the progeny. It was also found that material injury from the disease was somewhat sporadic even in the north.

These findings at once relieved the tension of the situation and with powdery scab thus reduced to the rôle of a minor potato trouble all the quarantines were lifted, the domestic ones on September 1, 1915 and the foreign on January 1, 1916.

In Australia the authorities were slower in understanding or even investigating the incidence of the disease systematically. Although powdery scab has been known to exist in isolated places for many years, its economic effect was so unimportant that the disease was virtually

shrouded in an air of mystery. This air of mystery, however, proved to be a great asset to certain people who in their interstate jealousies made powdery scab the shuttle-cock of politics. For years Australian potato growers spoke of the disease with bated breath; the Tasmanians, lest thereby they lost the valuable mainland markets, and the Victorians because they had been led to believe that if the disease appeared in their land, it would reduce values as one grower put it, "from £70 to £10 per acre." About the same time as the American scare, Victoria, where 50 per cent of Australia's potatoes are produced, became uneasy because of the possibility of introducing the disease from Tasmania, the small Island State. Since Tasmania produces some of the world's best quality tubers, it is imperative that the disease be excluded.

The Federal Constitution having abolished interstate customs duties, resorted to quarantine laws which were still State ordinances in order to prevent Tasmanian competition. Prior to 1926 an officer of the Victorian Department of Agriculture reported having seen powdery scab on potatoes in Tasmania. In 1926 a deputation representing Tasmanian potato growers visited Melbourne to present their case to the Federal Tariff Board, asking for an increase in the existing duty of £1 per ton on potatoes from New Zealand. The support of Victorian and New South Wales growers had been requested, but the former stated their intention of pressing the Federal Minister for Health to impose a quarantine embargo instead, on the grounds that powdery scab was known to exist in New Zealand.

Ironically enough, both representations were successful. Shortly afterwards Victoria asserted that consignments sent from Tasmania to Melbourne were carrying infection and threatened Legislative prohibition unless Tasmania exports ceased. It was intimated that Tasmanian potatoes would be allowed to be trans-shipped at Melbourne for transport by rail to N. S. Wales, provided they were not consigned to any destination short of Sydney. In this way Tasmania lost her trade with the Riverina district of N. S. Wales as well.

In 1931 Tasmania, for the first time, made investigations in Victoria and discovered that the disease already existed in that state. The Federal embargo against New Zealand brought reprisals in the form of an embargo on Australian citrus fruits, and now, though the Federal Government desires to remedy matters it finds a settlement a very difficult political problem owing to the fact that growers have had four very poor years. The position also arises that while the Tasmanian Government is fighting a case in the High Court against the Victorian

prohibition, certain members of the Tasmanian Parliament are loudly disclaiming against the Federal Government that they will ruin potato growers if they lift the embargo against New Zealand.

A Committee of Australian and New Zealand scientists recently declared that there is no longer any scientific reason for such a quarantine resriction. We are waiting for the reserved judgment of the High Court on the Tasmanian case to see whether science or politics is to administer quarantine regulations.

LIST OF DISTINCT POTATO VIROSES

DONALD FOLSOM AND REINER BONDE

Maine Agricultural Experiment Station, Orono, Maine

The purpose of the writers is to present a list of distinct potato viroses, together with the names of their viruses and probable synonyms in some instances. Most of this compilation is based upon the literature that is reviewed in various ways by several recent publications (1, 2, 3, 4, 8, and 9). Further references to the literature will be made only in a few instances where the publication is too recent to be included in any of these reviews, or where critical evidence needs to be cited.

A virosis is a disease for which we seem to require some practical, descriptive name. Such a name may best be based upon the symptoms in another kind of plant in case the symptoms are masked in the potato plant or in case the disease is rare in the potato plant. The causes of viroses are called viruses, although we are still ignorant of the exact nature of any virus with the possible exception of a tobacco mosaic virus (10).

In the following list are included 26 viroses that apparently are caused, in whole or in part, by 26 distinct viruses, respectively, although the latent virus of Green Mountains and other varieties is also present in some instances in addition to the distinctive virus, and several may yet be proved to be identical with others in the list. When possible, the name of the virosis is based upon symptoms in Green Mountain potatoes. The occasional designation of a virus as being equivalent to a virosis is unavoidable because of the common use of the name of a virus as being synonymous with the name of its virosis.

(1) Tobacco mottle and/or ringspot of J. Johnson. Usually found together (6, p. 41). Masked in most potato varieties. Synonyms: potato mottle and potato ringspot of Koch and Johnson (6, p. 40-41); seedling streak; latent virus; healthy-potato virus; X virus; B virus

of Fernow; simple mosaic; acronecrosis or top-necrosis. Probably several closely related viruses are involved.

(2) Tobacco ringspot of Virginia. Results in local infection of potato but is entirely distinct from the healthy-potato virus (5, p. 206).

(3) Tobacco mosaic. May be only partially systemic in potato plants of some varieties.

(4) Cucumber mosaic.

(5) Green Mountain rugose mosaic. Viruses: pure rugose mosaic and latent. Synonyms: veinbanding and mottle or ringspot, in combination (6, p. 42).

(6) Green Mountain mild mosaic. Viruses: pure mild mosaic and latent.

(7) Green Mountain crinkle mosaic. Viruses: probably pure crinkle mosaic and latent.

(8) Green Mountain leaf-rolling mosaic. Viruses: probably pure leaf-rolling mosaic and latent.

(9) Green Mountain interveinal mosaic. Viruses: probably pure interveinal mosaic and latent.

(10) Aucuba mosaic.

(11) Calico of Porter.

(12) Green Mountain streak. Viruses: possibly Y of Smith and latent (6, p. 43).

(13) Streak of Koch and Johnson (6, p. 45-46).

(14) Tomato spotted wilt.

(15) Bigarrure of Verplancke.

(16) Leaf roll.

(17) Apical leaf roll of Schultz and Bonde. Synonym: probably yellow top of Folsom (oral conclusion, Schultz to Folsom).

(18) Witches' broom. Synonym: wilding (7, p. 350, 355-356).

(19) Yellow dwarf.

(20) Aster yellows.

(21) Beet curly top.

(22) Spindle tuber.

(23) Unmottled curly dwarf.

(24) Transmissible low-growing habit of M'Intosh.

(25) Pseudonetnecrosis.

(26) Internal spotting in tubers (excluding some non-virotic kinds).

Green Mountain mottled curly dwarf is a mixture of leaf-rolling mosaic and spindle tuber. In general, however, curly dwarf is a mixture whose composition has been rather indefinite. The same is true of mosaic dwarf, leaf curl, and stipple streak.

Of tobacco spot necrosis, crinkle, paracrinkle, Up-to-Date streak, acropetal necrosis, A of Ireland, and B, C, D, and Z of England, each probably, or at least possibly, is the same as one of the list above, or a mixture of some of those listed above.

Marginal leaf roll and giant hill possibly are not viroses.

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REPORT OF THE SEED POTATO CERTIFICATION COMMITTEE

Statistics have been gathered regarding the production of certified seed potatoes in the United States and Canada and these data are submitted in table I.

TABLE 1—*Total production in bushels by varieties on acres which passed field inspections in the United States and Canada*

American Wonder	250	Early Rose	4,890
Beauty of Hebron	1,250	Early St. George	500
Bliss Triumph	2,609,613	Garnet Chili	4,500
Blue Victor	150	Gold Nugget	6,500
British Queen	10,000	Golden	3,350
Brown Beauty	28,550	Green Mountain	3,878,871
Burbank	8,110	Idaho Rural	4,250
Burpee's Early	441	Irish Cobbler	7,255,896
Carter's Early Favorite	1,500	Katahdin	269,691
Chippewa	11,658	Lady Llewellyn	2,500
Columbia Russet	5,000	McCormick	225
Cream of the Field	2,750	McLellan's Seedling	250
Dakota Red	6,802	Peachblow	262,143
Earliest of All	1,500	Russet Burbank	291,575
Early Bovee	5,750	Russet Rural	481,659
Early Epicure	5,500	Rust Proof	520
Early Michigan	500	Smooth Rural	391,911
Early Ohio	476,911	Spaulding Rose	339,558

Sutton's Reliance	500	White Gold	2,015
Vermont Viking	425	White Rose	70,513
Vick's Extra Early	250	Miscellaneous	14,450
Warba	72,891		
Wee McGregor	1,000	Total	16,551,208

Note regarding the use of varietal names. In the above list an attempt has been made to use the name for each variety most commonly used in the seed trade. Synonyms have been eliminated where recognized. Varieties, which have characteristics so similar that they might be regarded as strains of the same variety have also been grouped under one name. No doubt more of the names used could be eliminated. Possibly some groupings have been made which are not justified. The names eliminated and the treatment applied are shown below:

Dark Red Peachblow grouped under Peachblow.
Dooley, synonym of Smooth Rural.
Gold Coin, grouped under Green Mountain.
Hundred Day Cobbler, grouped under Irish Cobbler.
Jersey Red Skin, synonym of Dakota Red.
Late Cobbler, grouped under Irish Cobbler.
Netted Gem, synonym of Russet Burbank.
Perfect Peachblow, grouped under Peachblow.
Red McClure, grouped under Peachblow.
Rural New Yorker, synonym of Smooth Rural.
Sir Walter Raleigh, grouped under Smooth Rural.
White Rural, synonym of Smooth Rural.

In addition to this, the committee has been charged with the formulation of plans for securing greater uniformity of standards and especially of grades in the various states. Due largely to the fact that all the business of the committee has been transacted by correspondence and the field to be covered rests largely on a foundation of opinion, the committee has but little progress to report.

An attempt has been made to establish certain fundamental principles which might be used as a basis for further attempts.

1. It is recognized that conditions in different states vary and that for this reason it will probably never be possible nor indeed desirable for all states to use the identical standards. Nevertheless, present differences in standards are greater than should be the case.

2. The committee feels that one of the first steps towards greater uniformity must be an agreement as to the general form of the standard. If all standards could be written according to the same outline, it would be much easier to bring about greater uniformity.

3. In deciding the form of the standard, it will be necessary to decide what material should be included. At the present time, some states require 12 pages for their standards while some others use less

than one page. It is obvious that there is little agreement as to what constitutes material suitable for a standard. The committee is not unanimous as to the extent of the material to be included.

4. The committee feels that widely known grades should be used as a basis for certified seed grades and that the United States grades furnish such a basis.

5. It is the sense of the committee that grade requirements are to be regarded as distinct from size requirements. Whatever grade or grades may be proposed, there will be nothing to prevent potatoes of any given size from being included in the grade. We seem to agree that size is a question of taste and circumstances and has no relation to quality.

6. It is the sense of the committee that the size of potatoes should not be designated by the terms "No. 1, No. 2, and No. 3" since these terms are used in the U. S. grades with reference to quality rather than to size.

7. The committee was divided on the question of whether certified seed should be sold under one grade only or under two or more grades. Some felt that only one grade should be permitted while others believed that lower grades should be provided for the use of those who wished to secure disease-free seed at a low price and were not particular about such defects as sunburn, wire worms, cuts, bruises, scab, rhizoctonia, dirt, and shape. The committee reports, however, that at present potatoes which do not meet the primary grade can be sold as certified or inspected in eight states.

8. With regard to color of tag, the committee recommends that wherever possible blue be used either as the tag color or as the color of wording on the tag in connection with the best or only grade of certified seed.

Further, that if a second grade is used, the color of tag or printing be red.

To prepare the way for some agreement on the matter of rhizoctonia on tubers a set of 16 photographs was prepared showing different amounts of rhizoctonia, from 1.2 to 6.4 per cent of the surface being covered. These were submitted to the members of the committee and by them, in some cases, to federal market inspectors.

In all, nine market inspectors reported independently on the photographs. Of the 6 photographs designed to show more than 5 per cent of the surface covered, four were considered out of grade by every inspector, one was out of grade according to three inspectors and doubtful according to two others, whereas one tuber was passed by all with the exception of one man.

The members of the committee considered that the six tubers show-

ing more than 5 per cent of the surface covered should be considered out of grade and in addition most of them felt that three other tubers (with a lower surface coverage limit of 4.1 per cent) should be rejected.

If a comparison is made between U. S. No. 1 and the so-called New Jersey grade, on this basis, it should be borne in mind that although the U. S. grade scores only 4 out of the nine as severely affected tubers, it allows only 6 per cent of these provided there are no other defects while the New Jersey grade allows 5 per cent of the most severe cases in addition to 6 per cent for other defects. In addition the New Jersey grade allows 25 per cent of moderate infection while the U. S. grade specifies no limit. On the other hand, it is doubtful if potatoes showing 25 per cent of moderate infection would be passed under the U. S. No. 1 grade on the basis of general appearance of the lot. One possible solution of the rhizoctonia question which would seem to have the advantage of simplicity would be to require seed potatoes to be graded U. S. No. 1 with the understanding that any tubers showing more than a certain percentage of the surface covered by rhizoctonia be considered as damaged. Then it would only be necessary to agree upon the amount and have photographs showing this amount placed in the hands of inspectors. The discussion on rhizoctonia in the report has been written by the Chairman without consultation with the rest of the committee. Possibly some members of the committee might not concur.

It is suggested that the committee be continued with approximately the same membership for one more year with the expectation of drawing up, more definitely, a plan for securing greater uniformity in standards and grades. It is realized that neither the committee nor the Association has any prospect of imposing a standard or grade. Whatever plan is drawn up must be acceptable to the certification authorities and their clients and must then be presented to them in such a manner as to secure their support.

Respectfully submitted,

J. L. Budreau,
E. M. Gillig,
W. H. Martin,
J. C. Miller,
E. L. Newdick,
R. R. Pailthorp,
A. G. Tolaas,
H. O. Werner,
K. H. Fernow, *Chairman.*

State	Acres Entered	Acres Certified	Bushels Produced	Varieties	In Charge of Certification
California	484	362	72,810	Russet Burbank, Katahdin, White Rose, British Queen, Burbank, Bliss Triumph	H. W. Poulsen, Dept. of Agr., Sacramento
Colorado	2,915	1,281	352,458	Peachblow, Bliss Triumph, Brown Beauty, Katahdin, Irish Cobbler, Smooth Rural, Russet Burbank, Chippewa, Russet Rural	C. H. Metzger, Agr. Exp. Station, Fort Collins
Idaho	1,714	1,410	108,320	Russet Burbank, Bliss Triumph, Idaho Rural, Irish Cobbler, Early Ohio	E. R. Bennett, Agr. Exp. Station, Boise
Kentucky	81	78	7,135	Irish Cobbler	J. S. Gardner, Agr. Exp. Station, Lexington
Louisiana	1,475	1,136	31,000	Bliss Triumph	J. C. Miller, Agric'l. College, Baton Rouge
Maine	25,910	20,165	5,873,789	Green Mountain, Irish Cobbler, Spaulding Rose, Katahdin, Russet Rural, Bliss Triumph, Chippewa, Golden, Early Rose, Rust Proof, Early Michigan, Burpee's Early, Blue Victor	E. L. Newdick, Dept. of Agr., Augusta
Maryland	534	359	46,710	Irish Cobbler, Smooth Rural, Russet Rural, Dakota Red, Katahdin, McCormick, Chippewa	R. A. Jehle, Agr. Exp. Station, College Park
Michigan	1,990	1,590	366,460	Russet Rural, Green Mountain, Katahdin, Irish Cobbler, White Rural, Chippewa, Russet Burbank	H. C. Moore, Agr. Exp. Station, East Lansing
Minnesota	8,796	7,775	1,345,313	Irish Cobbler, Bliss Triumph, Early Ohio, Warba, Green Mountain, Chippewa, Katahdin, Russet Burbank, White Gold, Spaulding Rose, Smooth Rural, Golden	A. G. Tolaas, Dept. of Agr., St. Paul
Montana	664	663	120,072	Bliss Triumph, Katahdin, White Rose, Netted Gem, Irish Cobbler	E. E. Isaac, State College, Bozeman

State	Acres Entered	Acres Certified	Bushels Produced	Varieties	In Charge of Certification
Nebraska	11,182	8,504	814,710	Bliss Triumph, Irish Cobbler, Early Ohio	Marx G. Koehnke, Cert. Potato Growers' Alliance, Nebraska
New Hampshire ...	92	92	27,846	Green Mountain, Irish Cobbler	O. Butler, Agr. Exp. Station, Durham
New Jersey	502	482	44,095	Irish Cobbler, Dakota Red, Katahdin, Green Mountain, Chippewa	Paul B. Mott, Dept. of Agr., Trenton
New Mexico	83	75	7,000	Peachblow, Bliss Triumph	Tom Reid, New Mex. Crop Improvement Assoc'n., State College
New York	2,215	1,546	415,300	Irish Cobbler, Green Mountain, Smooth Rural, Russet Rural, Katahdin, Bliss Triumph, Early Ohio, Warba	K. H. Fernow, Cornell University, Ithaca
North Carolina	318	205	30,000	Irish Cobbler, Katahdin, Green Mountain	G. K. Middleton, N. C. Crop Improvement Asso'n., Inc., Raleigh
North Dakota	12,252	10,855	1,430,300	Irish Cobbler, Bliss Triumph, Early Ohio	E. M. Gillig, State Seed Comm., Dept. of Agr., Fargo
Ohio	28	26	5,000	Russet Rural	E. B. Tussing, State Univ., Columbus
Oregon					E. R. Jackman, Oregon Agr'l. College, Corvallis
Pennsylvania	811	540	146,154	Russet Rural, Smooth Rural, Irish Cobbler, Katahdin	K. W. Lauer, Dept. of Agr., Harrisburg
South Dakota	341	39	27,000	Irish Cobbler, Bliss Triumph, Early Ohio	K. H. Klages, State College, Brookings

State	Acres Entered	Acres Certified	Bushels Produced	Varieties	In Charge of Certification
Vermont	592	564	154,915	Green Mountain, Irish Cobbler, Katahdin, Spaulding Rose, Chippewa, Vermont Viking	H. L. Bailey, Dept. of Agr., Montpelier
Washington	602	439	99,508	Russet Burbank, Katahdin, White Rose, Irish Cobbler, Earliest of All, Burbank, Bliss Triumph, Early Ohio, Green Mountain	C. D. Gaines, Dept. of Agr., Olympia
Wisconsin	1,175	1,074	164,105	Bliss Triumph, Irish Cobbler, Smooth Rural, Green Mountain, Russet, Rural, Katahdin	J. G. Milward, Agr. Exp. Station, Madison
Wyoming	7,821	7,240	362,000	Bliss Triumph, Irish Cobbler	Wm. A. Riedl, Univ. of Wyoming, Laramie
Totals	86,577	66,669	12,006,208		
Canada	20,472	16,868	4,545,300	Irish Cobbler, Katahdin, Green Mountain, Bliss Triumph, Smooth Rural, Early Ohio, Russet Burbank, Gold Nugget, Early Bovee, Early Rose, Early Epicure, Columbia Russet, Garnet Chili, Cream of the Field, Peachblow, Spaulding Rose, Carter's Early Favorite, Burbank, Beauty of Hebron, Early St. George, Warba, Wee McCregor, Burpee's Early, Lady Llewellyn, Sutton's Reliance, American Wonder, McLellan's Seedling, Vick's Extra Early	John Tucker, Dept. of Agr., Ottawa

REPORT OF THE TWENTY-SECOND ANNUAL MEETING OF THE POTATO ASSOCIATION OF AMERICA

The twenty-second annual meeting was held from December 31 to January 2, inclusive. The attendance was excellent and 54 papers were presented during the six sessions. There were joint sessions with the American Society for Horticultural Science and the American Phytopathological Society. One of the interesting events of the meeting was the election of Dr. William Stuart as a honorary life member of the Association in recognition of his long and valued service to the potato industry. The session devoted to potato breeding proved to be of unusual interest. It was apparent that considerable progress is being made in the search for disease resistant varieties. It was pointed out, however, that much more progress could be made if the pathologists, horticulturists and others in the different states would cooperate in testing the new varieties developed by the plant breeders. A committee was appointed to work with the committee from the American Phytopathological Society to assist in bringing about a more extensive testing of these new varieties.

The following officers and representatives will serve in 1936:

President, Julian C. Miller, Louisiana State University, Baton Rouge, La.

Vice President, Fred H. Bateman, York, Pennsylvania.

Secretary-Treasurer, Wm. H. Martin, N. J. Agr. Exp. Sta., New Brunswick, New Jersey.

Executive Committee: F. A. Krantz, University of Minnesota, St. Paul, Minn.; Miles Horst, Harrisburg, Penna.; E. B. Tussing, Ohio State University, Columbus, Ohio; and John R. Tucker, Central Experimental Farms, Ottawa, Canada.

Members of the Potato Improvement Committee: R. W. Goss, University of Nebraska; Julian C. Miller, Louisiana State University; J. R. Livermore, Cornell University; F. M. Harrington, Montana State College.

Members of the Committee on Potato Consumption and Dietetic Value, E. V. Hardenburg, Cornell University; H. H. Bakken, University of Wisconsin, and C. H. Metzger, Colorado State College.

The following were continued as chairmen of Research Committees:

Culture and Storage, E. V. Hardenburg, Cornell University.
Potato Breeding, C. F. Clark, U. S. Department of Agriculture.
Fertilizer Investigations, Ora Smith, Cornell University.
Virus Diseases, Donald Folsom, University of Maine.
Potato Insects, G. F. MacLeod, Cornell University.

The following temporary committees were appointed to serve throughout the meetings:

Auditory Committee: Fred H. Bateman, E. J. Wheeler and F. A. Krantz.

Nominating Committee: J. R. Livermore, John S. Gardner and J. B. R. Dickey.

Resolutions Committee: John Bushnell, Julian C. Miller and H. O. Werner.

REPORT OF THE SECRETARY-TREASURER

At the close of this year the Association had 812 members. It is suggested that an effort be made to increase the membership list by asking the various state associations to enlist their members. This has been done by state potato associations in New Jersey and New York. This is made possible by action of the executive committee, taken three years ago. Under this plan individual subscriptions are $2.00 a year. In groups of 4 to 25 the rate is $1.75; 26-50, $1.50; 51-100, $1.00 and in groups of more than 100, 50 cents apiece. If this plan were generally adopted the members in the associations could be greatly increased at very little cost. At the present time numerous letters and sample copies of the Journal are being sent out but the response to this is usually not great.

The twelfth volume of the American Potato Journal contains 364 pages of printed matter and 64 of advertising. This is an increase of 10 printed pages as compared with volume 11 and 103 more than volume 10. The articles appearing in the Journal are a marked improvement over those of a few years ago, and your editor is greatly appreciative of the assistance given him by the authors. He is indebted also to those who have furnished the sectional notes. This portion of the Journal has met with considerable approval. The editor wishes also to express his appreciation to Dr. E. S. Clark of the New Jersey Agricultural Experiment Station for her very valuable assistance in editing the Journal. Without her help your editor would find it necessary to relinquish the position.

STATEMENT OF ACCOUNTS FOR THE YEAR ENDING DECEMBER 20, 1935

Receipts

Balance from 1934	$92.50
Annual Dues	1014.47
Sales of Advertising	1111.36
Reprints	167.54
Miscellaneous	20.05
Total Receipts	$2405.92

Expenditures

Printing and Mailing (Dec. to Oct. Inc.)	$1315.56
Reprints	137.20
Other Printing and Misc.	40.99
Secretarial Work	490.00
Stenographic Services	155.20
Stamps and Supplies	265.43
Total Expenditures	$2404.38

Bank Bal. Dec. 20—$1.54

Accounts Receivable

Sale of Advertising	$183.75
Reprints and Miscellaneous	44.77
Michigan Bank	145.63
	$374.15

Respectfully submitted,

WM. H. MARTIN, *Secretary-Treasurer.*

AUDITING COMMITTEE

We, the undersigned Auditing Committee, have examined the books of The Potato Association of America and have found them to be in good order.

FRED H. BATEMAN,
E. J. WHEELER,
F. A. KRANTZ.

RESOLUTIONS COMMITTEE

The Potato Association of America expresses its appreciation to Washington University for the facilities furnished for the 1935 meeting.

The Potato Association of America congratulates Dr. William Stuart of the United States Department of Agriculture upon completion of a long period of service to the potato industry, and expresses its deep appreciation of his foresight in founding and fostering our Association. It is hoped that at future meetings we will be honored by his attendance and counsel.

JOHN BUSHNELL,
H. O. WERNER,
J. C. MILLER.

ERRATUM—In the December issue of the American Potato Journal, in the article by Mader and Blodgett, the text to fig. 1 and 2 is reversed.

REVIEW OF LITERATURE

The "Preliminary Wilting Method" in Ecologically Considered Potato Farming (1) the Influence of Planting Time and Season on Amount and Quality of Yield, F. BERKNER, (*Landwirtschaftliche Jahrbücher, Vol. 78, pp. 791-831,* (1933).

Potatoes were planted at Breslau, Germany, during twenty-two successive weeks from the first week in April until the last of August during three years 1930, 1931 and 1932. Tubers were held in a condition suitable for planting by placing them in the greening frames in early April after the potatoes for the principal planting had been removed. The frames were placed on the north side of a building and covered only when frost threatened. Short conical or globular sprouts were produced.

When planted on various dates, yields were influenced by weather conditions. Yields from plantings made the latter part of May were 25 per cent. less, and those in July were 70 per cent. less than those of mid-April plantings, which were the highest. Very early April plantings were damaged by frost. With late plantings there was considerable loss from Phytophthora. The late variety Jubel, because of wide ecological adaptability, decreased less with later plantings than did the early and less adaptable Erdgold.

The starch content varied little during most years until plantings were made as late as mid-June. When Phytophthora was a factor, the starch content and tuber yield decreased greatly to 20 or 30 per cent. below the variety mean.

Concerning the seed value the following year the author concludes from comparative tests planted in April that: (a) The seed tubers from plants produced by the "preliminary wilting" method are of the highest vitality, even in the case of very much delayed plantings (August), if in the second year not too many little potatoes were used; and (b) with the methods used, the seed value was influenced not only by variety but also by weather and other deleterious factors that exerted an influence upon the decline of the life processes in the plant and developing tuber during the critical period of development of the potato plant (beginning of tuber setting to blooming time). The seed value of the variety Erdgold was much more easily deranged by adverse influences than the variety Jubel. During the year the seed potatoes were produced, the plants of different planting dates were differentially infected and damaged by Phytophthora infestans so that their metabolic processes were disturbed to an extent that appeared to cause differences in productivity of the seed potatoes the following year.

The rate and time of dry matter increase and intake of mineral nutrients, nitrogen, potassium, phosphorus, calcium and chlorine was determined at weekly intervals from samples secured from 10 stems of each variety from planting date. Dry matter was elaborated more rapidly with the early variety Johanssen than with the late Kruger, but the total amount elaborated was greatest with the later varieties. Most rapid increase in dry matter occurred during warm, moist days in July and August.

In healthy plants and in those in which life processes are unhampered, mineral nutrient intake proceeds more rapidly than dry matter increase. The mineral nutrients are taken at a uniformly rapid rate until the end of the blooming period, when the water balance appears deranged for a period after which absorption proceeds undisturbed until the leaves begin to die.

Of the minerals considered, potassium was taken up early and in greatest abundance, it having amounted to as much as 6.2 per cent. of the dry matter in the variety Krüger. Very good growing conditions are necessary for the absorption of such large amounts of potassium. The bulk of the potassium is taken up by the end of the blooming period or at latest before the leaves wilt. Potassium absorption and carbohydrate assimilation appear to be associated, but from their data the

authors do not claim a dependence of the latter upon the former process.

Of all essential nutrients the intake of nitrogen proceeded at the most uniform rate and was least influenced by weather changes. It continued to be absorbed so long as dry matter was elaborated. This applied to both the early and late varieties used. The percentage in both was about the same, in the neighborhood of 2.5 to 2.7 per cent. of the the starch percentage decreased in the tubers.

The intake of phosphorus was less than that of the other essential elements, comprising less than 0.75 per cent. of the total dry matter. They found that the intake of phosphorus does not depend upon the mass intake of other nutrients as claimed by other workers (principally in the early work of Liebscher), but it does facilitate the intake of potassium and nitrogen. The intake of phosphorus is greatly influenced by weather conditions, its intake being especially retarded when a high air temperature prevails at blooming time when water requirements are at the highest.

The calcium is associated with potassium intake, the former being high when the latter is low and vice versa. If intake of potassium is retarded, that of calcium advances. This appears to be due to the maintenance of a cation equilibrium. Calcium intake is generally less than half the potassium intake.

Very little chlorine is taken in. Its absorption generally is associated with that of the cations, potassium and calcium.

The supposed removal of nutrients from the plant at the end of the vegetative period is an oft-reported phenomenon. Berkner points out that it occurs mostly with potassium and calcium, the nutrients most easily washed out. He suggests, however, that some loss may occur by decay and breaking off of parts before harvest.

On the whole, nutrient intake paralleled increase in organic substance. Both are accelerated if the vegetative period is shortened either by genetic limitation such as earliness of a variety or by artificial methods such as late planting.—H. O. WERNER.

Greensprouting Seed Potatoes, E. V. HARDENBURG, (*Cornell University Experiment Station Bulletin* 632, (1935)).

The results of a four-year experiment comparing yields from greened and ungreened seed tubers of both Green Mountain and Rural varieties showed that greening is a profitable practice for New York potato growers. In 7 out of 8 comparisons, the yield of No. 1 potatoes from greened seed exceeded that from ungreened seed, the average dif-

ference being 17 bushels to the acre. Odds that this difference is significant were 40 to 1.

The effect of greening the seed tubers about 4 weeks prior to planting was to hasten germination, reduce the number of stems per plant, and increase the number of stolons and of tubers per stem. It did not pay to green seed longer than two weeks.

A comparison of planting depths of 2, 4 and 6 inches showed that two to four inches are best. In only one year of the four did planting as deep as 6 inches give the highest yields. This was in 1931 when rainfall during the growth period was distinctly below normal.—AUTHOR.

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IMPROVED VARIETIES NEEDED

In our efforts to improve the potato industry we cannot afford to devote our energies entirely to the solution of our immediate problems. While it is true that the chief concern at the present time is to secure better prices, we must give thought to the future of the industry, if we are to prevent a recurrence of our present difficulties. It is important, for example, that consideration be given to ways and means of increasing consumption; one way to bring this about is by the introduction of varieties of improved quality.

We are seriously in need of varieties which are of excellent quality not only from the culinary standpoint but which are also resistant to disease. We need varieties that are resistant to late blight, scab, leaf roll, mosaic and other diseases which have resulted in enormous crop losses. While progress has been made in this direction we are still a long way from our goal.

The Potato Association of America has assisted greatly in the potato breeding program and the committee recently appointed by the American Phytopathological Society is certain to help advance the work. The report of this committee is presented in this issue of the Journal. A number of valuable papers on potato breeding were presented at the St. Louis meeting and these will also be presented in the Journal from time to time.

It is apparent that the plant breeders are doing all they can in the search for new and improved varieties. Working alone, and with inadequate funds, they cannot accomplish all they would like. Everyone interested in the potato industry should support the potato breeding program both in the United States Department of Agriculture and in the various State Agricultural Experiment Stations. With the present interest and adequate support of the potato breeding program, progress in the development of disease resistant varieties of superior quality is certain to follow. This will be a real contribution to the future stability of the industry.